Comments on the Chesapeake Bay TMDLs
Docket Number EPA-R03-OW-2010-0736
Town of Occoquan

The Town of Occoquan submits its comments on the proposed Chesapeake Bay Total Maximum Daily Loads (TMDLs) as follows:

EXECUTIVE SUMMARY OF COMMENTS

Although styled as an effort to "restore" the Bay, the Chesapeake Bay TMDLs are not tied to any historical level of nutrient levels, nor do the TMDLs explain how the levels to which the Bay should be "restored" were determined. The EPA has not adequately demonstrated what levels constitute a "healthy" Bay, nor what the normal variability in these levels is, nor what are healthy levels in similar estuaries. While it is unclear whether the EPA has any scientific basis for the proposed TMDLs, it is clear that imposition of the TMDLs will be ruinously expensive for localities. Actually meeting the TMDLs may be physically or fiscally impossible.

EPA has failed to provide the public with sufficient data and documentation needed to review, evaluate, and fully comment on the proposed allocations. What information and data that is available show that the model and model inputs are lacking in the level of precision that should be required of regulatory action with consequences as significant and widespread as the Bay TMDL.

The Phase 5.3 model used to derive the proposed allocations is new, untested, and flawed, In its rush to establish the TMDL by an artificial deadline, EPA has proposed draft allocations without first calibrating the model and verifying the accuracy of the model predictions. In fact, EPA has effectively acknowledged that the model and model inputs are incomplete by announcing its intention to conduct additional model calibration after the TMDL is established.

Although the proposed backstop allocations reflect the difficulty of achieving significant load reductions from the agriculture and onsite septic sectors, they fall far short of reflecting the difficulty of achieving such reductions from the urban runoff sector. EPA appears to simply assume that the reductions can be achieved because MS4s are subject to federal and state permitting authority under the NPDES, but this assumption fails to recognize that the Localities own, on average, only about 20 percent of the land area within their respective jurisdictions. Therefore, most of the retrofits needed to achieve the load reductions will have to be implemented on private lands over which the Localities have no control in the absence of new development or redevelopment requiring local land use approvals. Eminent domain costs resulting from these requirements will be substantial.

I. INFORMATION REGARDING TOWN OF OCCOQUAN

A. Occoquan lies on the fall line of the Occoquan River and has a population of approximately 825 in an area of 0.2 square mile.

B. Town MS4 Programs – The Town does not have an MS4 program.

C. Factors Affecting Storm Water Control in Town – Occoquan is largely developed with townhouses, detached dwellings on small lots, and two story businesses with little to no pervious surfaces. There are very few remaining large parcels available for development, and those that exist are in the three acre range. Apart from those large parcels, some very small parks, and areas adjacent to stream beds, there are no areas of vegetation larger than a back yard.

D. The Socio-Economic Impact of the Proposed Urban Runoff Allocations – Although a precise calculation of the cost of the proposed TMDLs is beyond the staffing and financial resources of the Town, one likely effect would be to prevent any development or redevelopment within the Town. The long term effects of that would be to strangle the Town's vitality. The short term effect would be litigation challenging the Town's ability to impose the draconian standards required under the TMDLs.

II. EPA HAS FAILED TO PROVIDE OCCOQUAN WITH SUFFICIENT TIME TO REVIEW, EVALUATE, AND COMMENT ON THE DRAFT TMDLs

Despite the enormous size and complexity of the TMDL documents released on Sept. 24, the socio-economic consequences of the proposed allocations, and the arbitrary nature of EPA's decision to establish the TMDLs by Dec 31, 2010 when it could have given the public additional time to comment had it taken advantage of the May 2010 deadline in the consent decree, Occoquan does not have sufficient time to adequately review and respond to the TMDLs in detail. Occoquan will defend vigorously any claim of waiver due to failure to submit comments to the TMDLs on the basis that insufficient time was given to adequately respond.

III. OVERVIEW OF MODELS AND MODELING USED TO DERIVE THE PROPOSED URBAN RUNOFF ALLOCATIONS

The EPA models assume that urban development and agricultural activity caused the currently observed levels of phosphorus, nitrogen, and sediment in the Bay. Having assumed a cause, the EPA went out and found data to support the assumption. Whether or not some other cause would have explained more precisely the effect on the Bay was

not investigated. Nor did the EPA examine or consider whether current levels are outside the range of historic variation.

The Phase 5.3 Chesapeake Bay Watershed Model computer model (CBWM) is enormous, and has been described as one of the world's largest environmental models. The 64,000 square-mile watershed spans roughly one-quarter of the East coast of the United States. However, CBWM is only a component in the larger Chesapeake Bay Program suite of models.

Four major modeling components are used to develop the input data for CBWM . A substantial amount of nitrogen is deposited from the atmosphere into the Bay, and land use changes have significant implications for nutrient and sediment loading. All of this data is pre-processed in antecedent models, and then aggregated in a tool called the "Scenario Builder."

IV. EPA HAS FAILED TO PROVIDE THE HR LOCALITIES WITH ACCESS TO INFORMATION NEEDED TO FULLY EVALUATE AND COMMENT ON THE PROPOSED URBAN RUNOFF ALLOCATIONS

A. CBWM Input Mapping Data

To date EPA has not been able to document the tremendous amount of input data required for the TMDL modeling effort. The Virginia Department of Conservation and Recreation requested mapping from the Chesapeake Bay Program Office (CBPO) that would indicate locations of various urban land use categories (such as Impervious High Intensity, Impervious Low Intensity, Pervious High Intensity, and Pervious Low Intensity) used in the Phase 5.3 TMDL modeling. CBPO indicted that significant effort would be required to produce such mapping. Likewise, there is very little documentation that would allow modelers outside EPA to ascertain how the data was collected and synthesized, which makes working with CBWM a highly unreliable proposition at the state and local levels. More thorough disclosure of documentation is sorely needed, not merely on the model, but just as importantly on the data. Occoquan will defend vigorously any claim of waiver due to failure to submit comments to the TMDLs on the basis that EPA withheld pertinent information to evaluate the program.

B. Scenario Builder

The Scenario Builder was supposed to be available to the modeling community as part of the Chesapeake Bay Modeling Program, but has not yet been released outside EPA. Absent the Scenario Builder, modelers must rely on EPA to process the input data to CBWM, and cannot improve the model with local data. In fact, all of the 'modeling' that has been done by the State of Virginia to date is in essence 'post-processing' of EPA modeling results rather than independent modeling.

V. FLAWS IN THE MODEL USED TO DERIVE THE PROPOSED ALLOCATIONS

A. The Phase 5.3 CBWM has not been calibrated

EPA claims that the Phase 5.3 CBWM model has been calibrated. Yet 920 square miles of urbanized land have been erroneously entered as 'forest' in the model. A recalibration effort is expected to begin in October 2010, but will be too late to be adequately addressed by the 31 December 2010 mandated deadline for final publication of the Chesapeake Bay TMDL. EPA has promoted an "adaptive management approach" in developing this TMDL, thereby creating many moving goalpost situations. There are inherent problems with any calibration effort, and CBWM is no exception. There are many ways to tweak input variables in a complicated model to make the output approximate a series of observed data—a phenomenon known as 'equifinality'—and CBWM has a massive amount of input variables.

One indication of calibration problems is with sediment loading computations. CBWM cannot adequately match observed data for sediment loading, which held up the release of working sediment limits to the states until a month before their Watershed Implementation Plans (WIPs) were due. To accommodate the schedule, EPA adopted a "pucker factor" approach—to sidestep this problem with the model. If the Phase 5.3 model was adequately calibrated, sediment computations could be handled in a straightforward manner.

Many of the TMDL limits are targeted to pollutant reduction levels that are considerably less than the margin of uncertainty in the modeling process itself. Dr. Kathy Boomer of the Smithsonian Institute has conducted specific research and concluded that the margin of uncertainty in the TMDL models was much greater than the reductions being sought in pollutant loading. Dr. Ken Reckhow of Duke University (who chaired the Chesapeake Bay TMDL Review Committee for the National Academy) has repeatedly cautioned regulators against reporting modeling results without stipulating the uncertainty. Dr. Reckhow notes that TMDL prediction uncertainty is high, and Chesapeake Bay modelers have had issues with political decision makers being able to understand uncertainty. However, Section 5 of the Draft TMDL states:

> *"Models have some inherent uncertainty. Because of the amount of data and resources taken to develop, calibrate, and verify the accuracy of the Bay models, the uncertainly of the suite of models is minimized."*

Quite the opposite is true—the amount of data and complexity of the system work to increase the uncertainty, particularly when the source and content of the data have not

been disclosed. Such a statement cannot be substantiated, and certainly not with vague assurances that the model is based on "good" or "strong" science.

It is important to note that the mathematical equation for a TMDL is:

TMDL = Sum of Wasteload Allocations + Sum of Load Allocations + Margin of Safety

and the margin of safety is supposed to account for uncertainty in ensuring that the TMDL is effective, but there are errors and uncertainties *in the computation of the load allocations themselves*.

There are very few (perhaps only three or four) knowledgeable technical persons with meaningful CBWM modeling experience in Virginia. For a model that will be used as the basis for billions of dollars in regulatory mandates, the technical community is lacking the checking and validation that comes from widespread use. There is no significant bug reporting and code fixing occurring, and what little modeling is being performed is being done with data that has been distributed from EPA without enough documentation to check its validity. Other computer models, such as the EPA's own Storm Water Management Model (SWMM), have many years of active, widespread use, and debugging and code fixes occur continuously. The user community helps drive improvements that make SWMM a very well understood and reliable model. Conversely, CBWM is essentially an untested and unapplied model in 2010. The development of CBWM is undoubtedly an ambitious and worthwhile undertaking, but reasonable time has to be given to grow and mature CBWM to the point that it can be reliably used to justify billions of dollars of expense.

B. The Phase 5.3 CBWM does not produce reliable modeling results

EPA distributes the CBWM computer program in un-compiled form, meaning that in order to run the model users must obtain a FORTRAN compiler and generate the executable computer programs from the source code. However there is a known and still unresolved problem with CBWM producing different results when compiled on different computers. Identical input data was run on different computers in August 2010 for the James, York, and Rappahannock Rivers, and CBWM produced significantly different results—with variations as high as 36% in the answers. The reliability of CBWM cannot be corroborated until repeatable results can be produced. EPA is working on this problem, but its self-imposed TMDL schedule demands do not allow the time required to produce reliable and scientifically verifiable models and modeling results.

C. EPA is using the CBWM on a scale that is beyond its predictive capability

Due to the 64,000 square-mile extent of CBWM, there is an inherent problem of scale when addressing BMPs. CBWM is better suited for overarching computations on

larger scales, such as evaluating the effects of fertilizer applications on large segments of the Bay watershed, than it is in evaluating the effects of a particular BMP or group of BMPs on specific sites. EPA staff has acknowledged that the effects of individual, site-specific BMPs cannot be directly addressed in CBWM. Because the model is constructed on such a large scale, numerical effects of BMPs are lumped or aggregated in the modeling input data. This scale problem makes it very difficult for local governments to evaluate the feasibility of costly BMPs such as filtration devices and detention and retention basins that will have to be constructed to achieve water quality improvements. A single retention basin can easily cost millions of dollars, yet its effects cannot be directly isolated and evaluated in CBWM.

D. Existing imperviousness is underestimated in the CBWM

The Phase 5.3 CBWM model was prepared based on satellite photography. Early indications from four Virginia municipalities are that the use of satellite imagery has produced estimates of watershed imperviousness that are approximately 20 percent too low, which has significant implications for the amount of pollution that runs off each watershed. Localities have better imperviousness data in their Geographic Information Systems, but the TMDL development schedule did not allow time for EPA modelers to coordinate and collect this information from the localities. The implication is that if existing watershed imperviousness is underrepresented in CBWM, then so will be the existing pollution from urbanized areas. This inaccuracy could easily result in computed TMDL limits that are unattainable because in order to satisfy their "pollution diet," municipalities will have to reduce pollution based on modeling data that assumes they are substantially (20 percent) less impervious than they actually are. In other words, if their pollution diet starts by assuming that they have 20 percent less pollution-producing impervious cover than they actually have, then in order to meet their TMDL limits they would have to reduce *all* pollution from that 20 percent *plus* the reductions mandated by the TMDL—which are themselves very difficult to achieve. Refusal to accept more accurate data as the price of meeting an unrealistic deadline sets the Town of Occoquan up for failure.

E. There is no groundwater component in the CBWM

The absence of a groundwater component to the model is significant because groundwater transport of nutrients is a major source of pollution in the Bay. Ironically, many of the Best Management Practices (BMPs) that will be used to satisfy the TMDLs are based on removal of pollutants by infiltration, which is not addressed in the modeling. This lack of a groundwater component in CBWM means that pollutants that are routed into infiltration BMPs magically disappear from the computational universe—when in reality they are deposited into groundwater that eventually flows into the Bay.

VI. DISCONNECT BETWEEN THE AVAILABLE FACTS AND THE PROPOSED STANDARDS

A. Lack of data

EPA lacks solid data to support a baseline to which the Bay can be "restored." There simply are no historical data on phosphorus, nitrogen, or sediment levels in the Bay except some very limited data over the past few years. Although the TMDLs reference oyster levels in 1900, for example, there are no data on phosphorus, nitrogen, or sediment levels in that era. Without reliable data , even the best science has no idea whatsoever of the causes of current conditions. The EPA has no idea as to what pollutant levels constitute a "healthy" Bay, and but scant data as to the normal variability in these levels.

If the EPA has any data regarding comparable estuaries, it has failed to present it in support of its TMDLs. Contemporary data from elsewhere in the world could provide at least some scientific basis for the standards that EPA proposes to impose. No such data are, however, offered.

B. Data selected to support the conclusions drawn.

Where references are available, one finds highly suspect conclusions. A typical example is given by the last reference in Table 3.1 on pages 3-2 and 3-3. The last reference is to EPA 903-R-10-002, which would be the most recent publication supporting detrimental nutrient and sediment levels. Referring to measurements made in the years 1991-2000, that reference proclaims in a footnote "These years of Chesapeake Bay water quality monitoring program data were selected to be consistent with the hydrologic period for management application of the Chesapeake Bay Water Quality/Sediment Transport model." In other words, the chosen data best reflected the model output. Rather than letting the data drive the conclusions, the conclusions were in the driver's seat.

In Appendix F, page F-6 presents the 7 reasons for choosing 1991-2000 as the base study period. The first reason is that the data from that period most closely resembled the presumptive long-term flow metric on which the models are based. That is to say, the data resembled the expectations. The second reason is essentially the same as the first: each of the 9 river basins had flows matching the long term metric. The third reason is that the period overlaps the previous one used in a 2003 study, "to facilitate comparisons," yet the fourth reason describes why the chosen period is better than the previous one. The fifth reason is that a decade like 1991-2000 is easier to communicate to the public than the decade 1985-1994, and if any weaker legal justification has been offered by a government at any level of our federal system we'd like to know what it is. The sixth and seventh reasons are repeats of the first and second reasons. The models were calibrated on the period 1991-2000. The real bottom line is that model output agrees best with the data from the decade 1991-2000.

C. Lack of explanation for sampling methods.

Section 5 of the TMDL contains no background information given on the sampling theory used for monitoring the Bay and calibrating the watershed models. Assuming the Bay is no different from other natural features, its characteristics are cyclical. Sampling theory dictates a minimum of 2 samples per cycle; what are the pertinent cyclic parameters having an effect on the Bay, and how do the monitoring periods ensure capturing the data correctly? The monitoring periods have decreased from 20 times per year to 14, but no reason is given as to why this decrease has occurred. There is also no information given on when during the year those monitoring periods occur. If different pollution parameters have different cycles, then the monitoring periods must account for all the cyclic variations.

D. Known variability less than default allowances.

The TMDL on page 3-21 sets default allowances for exceeding the criteria, to be used when biological data are not available. These default values are determined to be no more than 10% of the area under the cumulative frequency diagram. This is a most curious default value, since the overages which drove the EPA to this TMDL were sediment +2.14%, nitrogen +7.28%, and phosphorous +4.43%, all below +10%. The TMDL is addressing values that fall within its own tolerance levels for uncertainty. This raises the question whether any regulation whatsoever is scientifically justified.

E. Obvious errors in data presented

Errors in Tables 8.3 and 8.4 go beyond mere typographical errors. If the entries in the TMDL are in error, then the ratings of some jurisdictions or river basins may change. Even if there are no changes, there are clearly errors in the draft TMDL table. If there are errors in the TMDL table, they could also impact the backstop allocations in Table 8.7.

VII. EPA DOES NOT HAVE THE AUTHORITY TO ESTABLISH A DEADLINE IN THE TMDL FOR ACHIEVING THE LOAD REDUCTIONS

The Clean Water Act and EPA's regulations do not give it the authority to establish a 2025 compliance deadline in the TMDLs.

Of all the source sectors covered by the TMDLs, none is affected more by the 2025 deadline that the urban runoff sector because much of the difficulty and cost of achieving the urban runoff load reductions is associated with retrofits independent of redevelopment. Historic re-development rates in the Occoquan watershed fall far short of those that would be needed to achieve the load reductions without forcing the localities to

acquire the easements needed for the retrofits and assuming responsibility for retrofit installation and maintenance.

VIII. CONCLUSIONS AND RECOMMENDATIONS

The Model results that are the basis for the proposed allocations are clearly lacking in the level of precision and certainty required to justify the resulting billions of dollars in costs. EPA professes to be taking an adaptive management approach to the TMDLs; but in reality, EPA is taking an adaptive legal and regulatory approach to the TMDLs by establishing the TMDLs based on incomplete and flawed science and then seeking to supply the missing documentation after the fact.

If EPA is truly committed to an adaptive management approach to the TMDLs, it would adopt them based upon the allocations in the Tributary Strategies and then update the TMDLs when the Phase 5.3 CBWM is fully transparent, developed and calibrated to within an acceptable margin of uncertainty. No time would be lost if EPA's accountability framework remains in place to ensure that progress toward achieving the Tributary Strategy allocations continues while work on the Phase 5.3 CBWM and model inputs are underway. In fact, the approach we recommend likely would achieve our mutual water quality goals for the Bay more efficiently, cost-effectively, and quickly by fostering the federal, state, and local partnership that is so critical to an undertaking of this magnitude. EPA's slavish adherence to an artificial deadline for establishing the TMDLs and its heavy-handed and opaque approach to date serves only to undermine that partnership and create distrust and resistance on the part of those who will bear the burden.

RESPECTFULLY SUBMITTED,
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